 <p>GLAST LAT PROCESS SPECIFICATION</p>	<p>Document # LAT-PS-01971-03</p>	<p>Date Effective February 1, 2004</p>
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	<p>Subsystem/Office Tracker Subsystem</p>	
<p>Document Title LAT Tracker MCM Functional Test and Visual Inspection Procedure</p>		

**Gamma Large Area Space Telescope (GLAST)
Large Area Telescope (LAT)**

**Tracker MCM Functional Test
and Visual Inspection
Procedure**

Change History Log

Revision	Effective Date	Description of Changes
1	May 5, 2003	Initial draft
2	November 3, 2003	Edit by R.J.; added instructions on discrepancy reporting; many other edits.
3	January 6, 2004	Add the other new MIPs, including the visual inspections. Require additional testing done with single connectors attached.

Table of Contents

Change History Log.....	2
1. Purpose.....	4
2. Scope.....	4
3. Acronyms and Definitions	5
4. Applicable Documents.....	5
5. Test System Hardware	5
6. Test System Software	6
7. Test Facilities required from the Assembly Vendor.....	7
8. Quality Assurance Requirements.....	7
8.1 Contamination Control.....	7
8.2 ESD Protection.....	7
8.3 Personnel Training.....	8
8.4 Requirements and Procedures for Work at SLAC.....	8
8.5 Configuration Control.....	8
8.6 Instrument Calibration	8
8.7 Non-Conformance Reporting.....	8
9. TCMC Mandatory Inspection Points	9
9.1 MIP 1: Pitch-Adapter Attachment Visual Inspection	9
9.2 MIP 2: Pre-Encapsulate Electrical Test and 100% Visual Inspection.....	9
9.2.1 Procedure for a Successful Inspection and Test	9
9.2.2 Procedure for a Failed Inspection or Test.....	10
9.3 MIP 3: Post-Conformal-Coat Electrical Test and Visual Inspection.....	10
9.3.1 Disposition Following a Successful Inspection and Test	11
9.3.2 Disposition Following an Unsuccessful Inspection or Test.....	11
9.4 MIP 4: End-Item Data Package Review and Approval	11
10. Archiving of Test Results	12
11. Electrical Test Procedure	12
11.1 Golden Board	12
11.2 Test Hardware Setup.....	12
11.3 Turning On the Test Equipment and starting the software	13
11.4 Executing the Test.....	14
11.5 Disconnecting an MCM from the Test Setup	14
12. Appendix: AIDS Forms for Each MIP	14

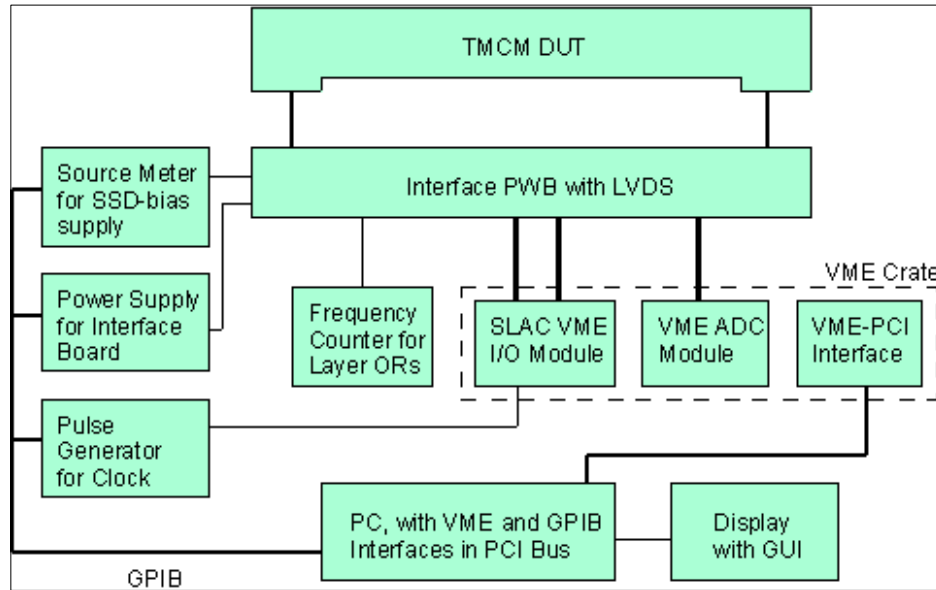


Figure 1. Block diagram of the MCM test system.

1. PURPOSE

The LAT Tracker MCM [1] must pass a complete functional test just prior to encapsulating the ICs and wire bonds and conformal coating the board. It must again pass the same test after encapsulation and conformal coating. This is one aspect of the overall electronics test plan documented in [2] and the MCM test plan documented in [3]. This document presents the procedure to be followed when performing the MCM functional test during the assembly process. It also presents the procedures for the mandatory visual inspections to be carried out by LAT personnel at the vendor assembly site.

2. SCOPE

This document applies to the MCM functional tests performed during MCM assembly prior to IC encapsulation and after final conformal coating. However, the electrical test procedure of Section 11 also applies to the acceptance tests performed on completed MCMs after burn-in and prior to shipment to Italy for tray assembly. The MCM test set constitutes a functionality test, not a performance test. The test methods employed in this procedure conform to Method 3014, “Functional Testing”, of Mil-Std-883.

In the following, “assembly vendor” refers to Teledyne Microelectronic Technologies and “customer” refers to the GLAST LAT project. In accordance with the Statement of Work LAT-PS-02158, the customer will perform all electrical testing of the MCMs with customer-furnished test equipment located within the facilities of the assembly vendor.

3. ACRONYMS AND DEFINITIONS

- DUT Device Under Test
- DRH Discrepancy Rework History
- EIDP End Item Data Package
- GLAST Gamma-ray Large Area Space Telescope mission
- GTFE GLAST Tracker Front End readout ASIC
- GTRC GLAST Tracker Readout Controller ASIC
- GUI Graphical User Interface
- LAT Large Area Telescope science instrument
- MCM Multi-Chip Module (Tracker front-end electronic readout board)
- MIP Mandatory Inspection Point
- SOW Statement of Work
- SSD Silicon Strip Detector

4. APPLICABLE DOCUMENTS

- [1] LAT-SS-00171, LAT Tracker Multi-Chip Module Specification
- [2] LAT-TD-00153, LAT Tracker Electronics Test Plan
- [3] LAT-TD-00249, LAT Tracker MCM Test Plan
- [4] LAT-PS-02367, LAT Tracker MCM Environmental Test and Burn-In Procedure
- [5] NASA-STD-8739.7, Electrostatic Discharge Control
- [6] LAT-MD-00404, LAT Contamination Control Plan
- [7] LAT-MD-00471, Control of Nonconforming Product
- [8] LAT-PS-02158, Multi-chip Module Assembly and Inspection Statement of Work
- [9] Teledyne Drawing #7108742 (LAT-DS-01856), Tracker MCM Assembly Process Instructions

5. TEST SYSTEM HARDWARE

Figure 1 shows a block diagram of the MCM test system. The equipment is listed in Table 1. All of the equipment except for the PC and printer, the DUT, and the interface board are mounted in an Agilent rack. Two copies of this test system have been assembled. The first will stay at the assembly vendor for testing MCMs before and after encapsulation of ICs and wire bonds. The second will stay in the SLAC GLAST clean room in Building 33 for final testing of burned-in MCMs prior to shipping to Italy. The equipment shall be maintained in calibration, with each calibration valid for one year. Each rack has attached to it a list and configuration of the equipment, including serial numbers and the calibration expiration dates.

6. TEST SYSTEM SOFTWARE

The custom software for the MCM test system is coded in Python (scripting language) and in C++ (generally at lower levels, where execution speed is important). The source code is stored in the LAT I&T CVS repository, where the complete history of revisions is maintained. The executable code used for testing of flight MCMs shall be derived directly from a specific release contained within that repository. The corresponding version number is entered onto the traveler. It is forbidden to use in flight MCM testing any software revision, no matter how small, that has not been checked into the CVS repository and incorporated into a new release and new version number. New releases shall be approved by the Tracker Subsystem Manager prior to use on flight MCMs.

Table 1. Hardware use for production testing of the TMCM, supplied by the customer.

Item	Model	Description
VME Crate	ELMA	VME Crate with five slots
VME-PCI	National Instrument PCI-VMW8026	Interface between the PCI bus of a PC and VME backplane.
PC	Dell	Includes a card for the VME interface and a GPIB Controller card.
COM	SLAC custom design cable	VME-I/O data acquisition module
ADC	Systran VMESC5 ADM1224F	VME module used to measure LVDS output levels and power supply current draw.
Pulse Generator	LeCroy 9211	Pulse generator for the external clock. GPIB controlled.
Frequency Counter	Agilent 53131A	Used to monitor the trigger output signals from the GTFE chips (Layer-OR signals).
Power Supplies	HP 3646A	Provides DC power for the TMCM Interface card.
Source Meter	Keithley 2410	Provides SSD bias and measures leakage current
Oscilloscope	Tektronic EDS 640	Provides visual monitoring of digitals signal when needed for debugging
Test Interface Unit	SLAC custom design LAT-DS-00367	Provide TMCM power (AVDDA: DVDD, and AVDDB) and buffering , digital inputs and outputs for all commands and data.
Cable	Custom	From VME COM card to Test Interface Unit.
Wrench		Torque limiting screwdriver with 0.050" hex bit.

The test software includes a Graphical User Interface (GUI) used to call subroutines that perform each functional test as described in document LAT-TD-00249. In addition to the digital functionality tests, there are tests of power consumption and limited performance tests. The criteria for a successful test are documented in LAT-TD-00249.

7. TEST FACILITIES REQUIRED FROM THE ASSEMBLY VENDOR

- Approximately 4 ft by 4 ft floor footprint for the test rack.
- 110VAC 30 amp electrical service for the test rack.
- 110VAC standard receptacle for the PC, monitor, and printer.
- One 3 ft by 6 ft (or 3 ft by 5 ft) workbench with ESD mat and chair.
- Good lighting (comparable to the test lab where detailed visual inspections are performed).
- One stereo microscope, with zoom up to at least 10x, with lighting for visual inspection.
- Cabinet for safe storage of MCMs staged for electrical test and for MCMs after test completion.
- Phone access.

8. QUALITY ASSURANCE REQUIREMENTS

8.1 CONTAMINATION CONTROL

The facility and procedures satisfy contamination control requirements as stated in the Teledyne 7700507 General Requirement Procedure document. The clean room and the MCM-testing procedures conform to the requirements imposed by the LAT contamination control plan, LAT-MD-00404.

MCMs are handled outside of their metal trays or anti-static bags only while wearing gloves or finger cots and mask, as well as the clean-room smock and hair net and ESD wrist strap (see Section 8.2).

8.2 ESD PROTECTION

The facility and procedures satisfy ESD protection requirements as stated in the Teledyne 7250468 ESD Procedure document.

- The entrance to the clean room shall be clearly posted as an ESD controller area during all MCM procedures.
- A conductive, grounded antistatic floor mat, or antistatic floor, shall be present in front of the MCM test and assemble stations and grounded anti-static mats shall be present on the tabletop work surface.
- All equipment, including the test station, computer, VME crate, auxiliary electronics, and antistatic mats, shall be grounded to the third terminal ground of the electrical outlet.

- Clean-room smocks with conductive fibers shall be worn.
- An ESD protecting wrist strap shall be put on and verified by the wrist-strap checker prior to handling any electronics or flight parts.
- The operator shall be grounded by the wrist strap at all times when handling the MCM. The grounding connection shall be mounted to the front edge of the worktable.
- A humidity meter/recorder shall be in the clean room and monitored at required intervals to verify that the relative humidity remains within specifications (>30%).

8.3 PERSONNEL TRAINING

All personnel working in the clean room during LAT Tracker MCM testing shall have completed a training tutorial in clean-room procedures and in ESD protection. All personnel operating the MCM test station and shall be trained by the SCIPP experts on the MCM test system and shall complete a practice session carried out on non-flight hardware prior to working with flight hardware.

8.4 REQUIREMENTS AND PROCEDURES FOR WORK AT SLAC

A final test of the MCMs is carried out using this system and the electrical test procedure (Section 11 and LAT-TD-00249) in the SLAC cleanroom immediately prior to shipping the MCMs to Italy for integration onto Tracker trays. Refer to LAT-PS-02367 for the procedures to be followed by the test personnel working in the SLAC cleanroom.

8.5 CONFIGURATION CONTROL

Configuration control of the software is accomplished through use of a CVS archive, as described in more detail in Section 6.

The hardware configuration is controlled by mounting the test equipment in a locked rack. Attached to the rack is a configuration logbook. Included in the logbook are

- the equipment list with serial numbers and calibration dates,
- cabling diagram for the equipment,
- log of changes to the hardware configuration, including an identifier of the configuration, which shall be noted on the traveler of each MCM.

8.6 INSTRUMENT CALIBRATION

The hardware used for Tracker MCM testing is listed in Table 1. All test equipment used for measurements shall be calibrated prior to testing of flight MCMs, and the calibration must be valid during all flight MCM testing. Each calibration is valid for no longer than one year before renewal is required.

8.7 NON-CONFORMANCE REPORTING

All non-conformances discovered during the electrical test procedure shall be reported by the customer personnel performing the electrical tests using the LAT project NCR reporting system located at <http://www-project.slac.stanford.edu/glastqa/Default.htm>. To ac-

cess the system from the vendor facilities, the computer first is connected to the web via a UCSC dialup account set up on the PC Desktop, and then a connection is logged into SLAC via the VPN (Virtual Private Network) icon also set up on the PC Desktop. All NCRs shall be dispositioned by a Material Review Board (MRB) as specified in the Statement of Work (SOW) LAT-PS-02158.

9. TMCM MANDATORY INSPECTION POINTS

See the appendix for the travelers (AIDS forms) to be used in each of the following Mandatory Inspection Points (MIPs).

9.1 MIP 1: PITCH-ADAPTER ATTACHMENT VISUAL INSPECTION

The Teledyne inspection of the attachment of the pitch-adapter flex-circuit to the PWB is repeated, following the instructions in Teledyne Drawing #7108742.

9.2 MIP 2: PRE-ENCAPSULATE ELECTRICAL TEST AND 100% VISUAL INSPECTION

The operator removes the test article from the storage cabinet. It is in a metal tray with its traveler placed on top. The tray lid is removed and set aside. The operator visually inspects the MCM to verify

- that the wire bonds are protected by a properly installed wire-bond protection cover,
- that the MCM is installed correctly on the backing plate with screws, including a single grounding screw,
- that all tantalum capacitors are installed with the correct polarity,
- that the connectors and connector savers are properly installed,
- and that the MCM is not visibly damaged.

The wire bond protection cover is carefully removed and the MCM placed under the microscope, taking care not to touch any wire bonds. The wire bonds are inspected, with special attention paid to those connecting the chips and board to the pitch-adapter flex circuit (since these cannot be verified by the electrical test). The operator checks that each bias wire bond is doubled.

The wire-bond protection cover is replaced. The results of the inspection are noted on the traveler, and the test article is placed on the worktable next to the test interface unit.

If no damaged wire bonds were found, then the procedure of Section 11 is followed in order to execute the electrical test.

9.2.1 Procedure for a Successful Inspection and Test

The test article is placed back into its metal tray and the lid replaced. The traveler is updated to indicate a successful test, the electrical test summary is attached, and it is placed with the tray into the appropriate storage cabinet.

9.2.2 Procedure for a Failed Inspection or Test

If bad wire bonds were found, or another defect was found that could be corrected by standard rework, then the operator fills in the DRH (Discrepancy Rework History) on the back of the Teledyne traveler. The MCM is placed back into its metal tray (with wire-bond protection fixture attached) and the tray cover installed. The tray and the MCM's traveler are placed into the cabinet location for MCMs to be reworked.

In the case of a failed electrical test the following procedure applies. The operator studies the test output to isolate the error to one or two ICs. If necessary, the GUI allows individual tests to be repeated. It can also print detailed output summaries to aid in fault isolation. If the fault is not obviously internal to an individual IC, then the operator carefully inspects the MCM under the microscope with the wire-bond protector removed to look for missing or bad wire bonds on the relevant ICs. If bad wire bonds or faulty soldering are found, or if the operator strongly suspects that an IC is bad, then the discrepancy information and disposition are entered into the DRH chart attached to the MCM's traveler, together with the operator's initials and the date. The wire bond protection cover is reinstalled immediately after completing any visual inspection.

In case that time does not immediately permit this debugging procedure, or in case an appropriate expert is not immediately available for debugging, then the MCM is disconnected from the test setup by the procedure presented in Section 11.5, and its traveler is updated to indicate failure of the test. It is placed back into its tray, the lid replaced, and it and its traveler are put aside in a specified cabinet to await debugging.

If the DRH was filled out indicating that standard rework is needed (such as replacing an IC), then the MCM is disconnected from the test setup by the procedure presented in Section 11.5. It is then put back into its tray and the lid replaced, and the MCM is stored with its travel in the specified location for MCMs needing rework.

If the inspection or debugging indicates a problem that cannot be isolated or cannot be corrected by standard rework, then an NCR is completed and submitted, the traveler is updated to indicate the failed test and the NCR number. The MCM is put back into its tray, the lid replaced, and the MCM and traveler are placed into the appropriate cabinet to await disposition of the NCR.

9.3 MIP 3: POST-CONFORMAL-COAT ELECTRICAL TEST AND VISUAL INSPECTION

For an MCM to be tested post-encapsulation, the operator removes the test article from its ESD storage bag and places the black plastic storage box flat on a clear work surface. The lid is carefully removed, and the operator performs a visual inspection to verify that

- the MCM has two connector savers properly attached,
- the encapsulation properly covers the chips and wire bonds and does not spill over into areas where it can cause problems,
- the conformal coat covers the circuit and is not peeling off,
- and that there is no apparent damage to the MCM.

The 10x microscope may be used in this inspection if needed. Following the inspection the lid is replaced and the results of the inspection are noted on the traveler.

To execute the final electrical test, the MCM in its closed box is placed on the table next to the test system interface unit, and the procedure of Section 11 is followed.

9.3.1 Disposition Following a Successful Inspection and Test

The MCM, in its black storage box, is inserted into its antistatic bag. The traveler is updated to indicate a successful final test and inspection and the test summary is attached, and it is placed with the MCM into the appropriate storage cabinet to await source inspection.

9.3.2 Disposition Following an Unsuccessful Inspection or Test

If a defect was found during inspection that could be corrected by standard rework (such as reworking the conformal coat), then the operator fills in the DRH form on the back of the Teledyne traveler. The MCM, still inside its black plastic case, and its traveler are placed into the cabinet location for MCMs to be reworked.

If a defect is found during inspection that cannot be corrected by standard rework, or if the MCM fails the final electrical test, then an NCR is completed and submitted documenting the failure. The traveler is updated to indicate the failed final test. The MCM is put back into its anti-static bag, and it and its traveler are placed into the appropriate cabinet to await disposition of the NCR.

9.4 MIP 4: END-ITEM DATA PACKAGE REVIEW AND APPROVAL

This is the source inspection of the MCMs and their EIDP by SLAC prior to taking ownership of them and shipping them to SLAC. The inspector shall check the following items:

1. Each MCM shall be vacuum packed in an ESD protective bag. The serial number shall be clearly marked and visible.
2. The Teledyne shipper shall correctly identify the serial numbers of the MCMs. On the shipper is a space for the signature of the SLAC inspector at the conclusion of the inspection.
3. The shipper shall also specify the revision levels of the assembly drawing, LAT-DS-00898 or LAT-DS-00899, and of the process specification, Document 7108742, to which the MCM was built.
4. There shall be a Teledyne Certificate of Compliance applicable to each MCM.
5. Each MCM shall have a complete copy of the Teledyne shop traveler, including the electrical test report summaries.
6. Together with the traveler shall be a copy of each NCR, if any, applicable to the MCM. Any such NCR shall clearly state the disposition by the MRB.

7. The inspector shall complete and attach the SLAC traveler for the MIPs.

10. ARCHIVING OF TEST RESULTS

The test data ultimately are archived in an MS-Access database, of which the primary copy is located on a computer at UCSC. However, during the test execution the detailed test data are written to files on the PC hard disk. At the end of testing of an MCM lot, the operator is responsible for copying the files onto a CD-ROM. The CD is returned to UCSC to be archived after copying the data into the primary database.

11. ELECTRICAL TEST PROCEDURE

11.1 GOLDEN BOARD

With the electrical test rack is a “golden board” MCM that is known to be functional. At the beginning of each test session, after powering up the test system, the golden board is mated to the system and the test sequence is executed to verify that the results from this known MCM have not changed.

11.2 TEST HARDWARE SETUP

The operator looks at the HP 3646A power supply to verify that the LCDs displays “OUTPUT OFF” prior to connecting an MCM to the test equipment. The left-hand MCM connector saver is mated by hand to a corresponding connector saver on the test interface board. The two jackscrews are then alternately turned to pull the connectors together. The final torque should not exceed 10 inch-ounces, to avoid damage to the connector savers. Repeat for the right-hand connector saver.



The image shows a graphical user interface with three input fields. The top-left field is labeled 'TMCID ID: tmcid' and contains the value '000'. The top-right field is labeled 'TMCID Operator: tmcid' and contains the value 'name'. The bottom field is labeled 'Test Selection' and contains two radio buttons: 'Initial' (which is selected) and 'Final'.

Figure 2. GUI entries to be filled out by the operator prior to executing the test.



Figure 4. The MCM test GUI.

11.3 TURNING ON THE TEST EQUIPMENT AND STARTING THE SOFTWARE

The operator turns on the test equipment rack with the white button located at the top right hand side of equipment rack. Verify that all instruments powered up successfully and completed their initial turn-on sequences. At this time the operator turns on the computer and logs on with the user name and password provided.

To initialize the communication between computer and VME crate the operator double clicks on the Resman. At the successful completion of Resman, the Resource Manager software, a popup box appears. Click on the OK button to close the popup.

To start up the MCM test GUI, illustrated in Figure 4, the operator double clicks on the TCM TEST icon. This GUI controls the test system and allows the operator to start the MCM test sequence described in Tracker TCM Test Plan LAT-TD-00249.

11.4 EXECUTING THE TEST

The operator enters the MCM serial number, operator name, and selected test into the GUI elements illustrated in Figure 2. Select “Initial” for the pre-encapsulation test and “Final” for the post encapsulation test.

The operator starts the test execution by clicking on the “Start Test” button. The software turns on the MCM and performs all the tests in sequence. At the completion of all tests the software turns off the MCM. The software then prints a summary of the results on the screen and prompts the operator with the PASS or FAIL status. Note that in all cases the program automatically saves the detailed test data to the hard disk of the PC.

To make sure that the left-right redundancy is intact, the test program requests at certain moments for connector savers to be demated or mated. The sequence goes as follows (see LAT-TD-00249 for the test definitions):

1. Power-on and measure current draws and LVDS levels (TM702 and TM708).
2. Measure the leakage current of the bias line (TM703).
3. Power-off and a window pops up to ask the operator to unplug the right-side connector.
4. Perform functionality tests at 20 MHz from the left side (TM704, TM705, TM706, TM707, TM709, TM711, TM712, TM713, and TM716).
5. Power-off and a window pops up to ask the operator to unplug the left-side connector and plug in the right-side connector.
6. Perform functionality tests at 20 MHz from the right side.
7. Power-off and a window pops up to ask the operator to plug in both left and right connector savers.
8. Perform functionality tests from both sides at 14, 20, and 22 MHz.
9. Perform the performance tests (TM710, TM714, and TM715) at 20 MHz.

The test program controls power on/off automatically during this procedure.

11.5 DISCONNECTING AN MCM FROM THE TEST SETUP

The operator looks at the HP 3646A power supply and verifies that the LCDs display ‘OUTPUT OFF’. The operator then disconnects the MCM test article from the interface test board by demating the two connector savers. A connector is demated by backing out the two jack screws alternately until completely loose. Then a very light pull by hand should disconnect the connector savers from each other. Place the MCM back into its metal tray and replace the cover (or replace the top on the black MCM carrying case for a completed MCM).

12. APPENDIX: AIDS FORMS FOR EACH MIP

ASSEMBLY AND INSPECTION DATA SHEET

AIDS NO. TMCM MIP-1 0001

Project LAT	Equipment Title Tracker MCM In-Process Inspection and Test MIP-1	Drawing/Part No. (select one) LAT-DS-00898 (short) LAT-DS-00899 (tall)	Revision	Serial Number
Reference Designator N/A	Subsystem Tracker	Equipment Class Flight	Prepared By R. Johnson	
Approvals				
Responsible Engineer D. Rich		Date	Manufacturing Engineer J. Clinton	Date
Quality Engineer D. Marsh		Date		

TMCM MIP-1: Pitch-Adapter Attachment Visual Inspection				
Note: All MCM handling, inspection, and testing shall be done in compliance with LAT-MD-00404, LAT Contamination Control Plan. The operator shall wear gloves or finger cots and mask at all times when handling an MCM.				
Step	Instructions	Oper. ID	Date	Stamp
10	Remove the MCM from its tray and place it on a clean work surface. Follow the instructions laid out in Teledyne document #7108742 for inspection of a pitch adapter attached to an MCM PWB. <ul style="list-style-type: none"> • If the MCM passes the inspection, replace it in its tray, initial the Teledyne traveler, and place the tray and traveler in the appropriate storage cabinet. • If the MCM fails the inspection, note the failure on the traveler, fill out an NCR and set the MCM aside in the appropriate cabinet. Enter the number of the NCR: _____ 			

Distribution:

ASSEMBLY AND INSPECTION DATA SHEET

AIDS NO. TMCM MIP-2 0001

Project LAT	Equipment Title Tracker MCM In-Process Inspection and Test MIP-2	Drawing/Part No. (select one) LAT-DS-00898 (short) LAT-DS-00899 (tall)	Revision	Serial Number
Reference Designator N/A	Subsystem Tracker	Equipment Class Flight	Prepared By R. Johnson	
Approvals				
Responsible Engineer D. Rich		Date	Manufacturing Engineer J. Clinton	Date
Quality Engineer D. Marsh		Date		

TMCM MIP-2: Pre-Encapsulate Electrical Test and 100% Visual Inspection

Notes:

- a. All MCM handling, inspection, and testing shall be done in compliance with LAT-MD-00404, LAT Contamination Control Plan.
- b. ESD-protection procedures shall be followed, as specified in NASA-STD-8739.7, at all times when handling MCMs outside of their closed production trays or sealed ESD-protective packages.
- c. The specification for this procedure is **LAT-PS-01971**. Refer to LAT-PS-01971 for details of each of the following steps, as well as for requirements and specifications and for descriptions of the test scripts.

Step	Instructions	Oper. ID	Date	Stamp
10	Place the metal tray on the work surface, remove the top, remove the MCM on its carrier and place it on an uncluttered area in front of the inspector position. Check that the serial number matches the traveler.			
15	Enter the iteration of the pre-encapsulation visual inspection and test for this MCM SN, starting with 1: Iteration: _____			
20	Inspect the following items: a. The wire bonds are protected by a properly installed wire-bond protection cover. b. The MCM is installed correctly on the backing plate with screws, including a single grounding screw. c. All tantalum capacitors are installed with the correct polarity. d. The connectors and connector savers are properly installed. e. The MCM is not visibly damaged.			

Distribution:

ASSEMBLY AND INSPECTION DATA SHEET

AIDS NO. TMCM MIP-2 0001

TMCM MIP-2: Pre-Encapsulate Electrical Test and 100% Visual Inspection

Notes:

- a. All MCM handling, inspection, and testing shall be done in compliance with LAT-MD-00404, LAT Contamination Control Plan.
- b. ESD-protection procedures shall be followed, as specified in NASA-STD-8739.7, at all times when handling MCMs outside of their closed production trays or sealed ESD-protective packages.
- c. The specification for this procedure is **LAT-PS-01971**. Refer to LAT-PS-01971 for details of each of the following steps, as well as for requirements and specifications and for descriptions of the test scripts.

Step	Instructions	Oper. ID	Date	Stamp
30	Remove the wire-bond protection cover and place the MCM under the stereomicroscope. Inspect the following: <ol style="list-style-type: none"> a. Each bias pad has two wire bonds. b. Each amplifier input is bonded securely to the pitch adapter. c. No wire bonds are missing or smashed or shorting to neighbors. d. Replace the wire bond protection cover and place the MCM next to the electrical test fixture. 			
35	If the above inspections are not satisfactory, then do one of the following: <ul style="list-style-type: none"> • If the problem can be corrected by standard rework, then fill out the DRH on the back of the Teledyne traveler, replace the MCM into its tray and cover, and place the MCM in the appropriate cabinet for MCMs to be reworked. • If the problem cannot be corrected by standard rework, note the problem on the Teledyne traveler, then submit an NCR and set the MCM aside in the appropriate cabinet. 			
40	If this is the first test of the session, execute the electrical test sequence on the “golden board.” Verify that the results are consistent with expectations.			
50	After verifying that the HP 3646A power is off, use the calibrated torque wrench to mate the two connector savers on the MCM under test to the corresponding connector savers on the test fixture. The torque shall not exceed 10 inch-oz. Power on the test equipment rack and log into the computer; start up the Resman and the GUI.			
60	Fill in the required information on the GUI box, including MCM serial number and operator ID. Start the test sequence.			
70	Review the test summary. <ol style="list-style-type: none"> e. If the test failed, attach the test summary to this form. Then attempt to debug the problem. If appropriate, fill out the DRH accordingly and submit the MCM for standard rework. After rework, this entire procedure must be reiterated using a new AIDS form, to be attached on top of the previous form. 			

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ASSEMBLY AND INSPECTION DATA SHEET

AIDS NO. TMCM MIP-2 0001

TMCM MIP-2: Pre-Encapsulate Electrical Test and 100% Visual Inspection

Notes:

- a. All MCM handling, inspection, and testing shall be done in compliance with LAT-MD-00404, LAT Contamination Control Plan.
- b. ESD-protection procedures shall be followed, as specified in NASA-STD-8739.7, at all times when handling MCMs outside of their closed production trays or sealed ESD-protective packages.
- c. The specification for this procedure is **LAT-PS-01971**. Refer to LAT-PS-01971 for details of each of the following steps, as well as for requirements and specifications and for descriptions of the test scripts.

Step	Instructions	Oper. ID	Date	Stamp
	f. If the problem cannot be successfully debugged, then note the problem on the Teledyne traveler, set the MCM aside in the appropriate cabinet, and submit an NCR. Enter the number of the NCR: _____ g. If the test is successful, then attach the test summary to the Teledyne traveler.			
80	Disconnect the MCM from the test setup and replace it in its tray. Replace the tray cover and place the tray and traveler together in the appropriate cabinet.			

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ASSEMBLY AND INSPECTION DATA SHEET

AIDS NO. TMCM MIP-3 0001

Project LAT	Equipment Title Tracker MCM In-Process Inspection and Test MIP-3	Drawing/Part No. (select one) LAT-DS-00898 (short) LAT-DS-00899 (tall)	Revision	Serial Number
Reference Designator N/A	Subsystem Tracker	Equipment Class Flight	Prepared By R. Johnson	
Approvals				
Responsible Engineer D. Rich		Date	Manufacturing Engineer J. Clinton	Date
Quality Engineer D. Marsh		Date		

TMCM MIP-3: Post Conformal Coat Electrical Test and 100% Visual Inspection

Notes:

- All MCM handling, inspection, and testing shall be done in compliance with LAT-MD-00404, LAT Contamination Control Plan.
- ESD-protection procedures shall be followed, as specified in NASA-STD-8739.7, at all times when handling MCMs outside of their closed production trays or sealed ESD-protective packages.
- The specification for this procedure is **LAT-PS-01971**. Refer to LAT-PS-01971 for details of each of the following steps, as well as for requirements and specifications and for descriptions of the test scripts.

Step	Instructions	Oper. ID	Date	Stamp
10	On the inspection work surface, remove the cover from the MCM carrying case and inspect the following: <ol style="list-style-type: none"> The MCM has two connector savers properly attached. The black encapsulation properly covers all of the wire bonds, does not spill over into areas where it could cause problems. The conformal coat covers the circuitry and is not peeling off. There is no apparent damage to the MCM. Replace the cover over the MCM. If the inspection is not satisfactory, then do one of the following: <ul style="list-style-type: none"> If the problem can be corrected by standard rework, then fill out the DRH on the back of the Teledyne traveler, and place the MCM in the appropriate cabinet for MCMs to be reworked. If the problem cannot be corrected by standard rework, then submit an NCR. However, continue with 			

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ASSEMBLY AND INSPECTION DATA SHEET

AIDS NO. TMCM MIP-3 0001

TMCM MIP-3: Post Conformal Coat Electrical Test and 100% Visual Inspection

Notes:

- a. All MCM handling, inspection, and testing shall be done in compliance with LAT-MD-00404, LAT Contamination Control Plan.
- b. ESD-protection procedures shall be followed, as specified in NASA-STD-8739.7, at all times when handling MCMs outside of their closed production trays or sealed ESD-protective packages.
- c. The specification for this procedure is **LAT-PS-01971**. Refer to LAT-PS-01971 for details of each of the following steps, as well as for requirements and specifications and for descriptions of the test scripts.

Step	Instructions	Oper. ID	Date	Stamp
	the electrical test, so that the MRB will know the functional status of the MCM. Indicate here the NCR number: _____			
15	If this is the first test of the session, execute the electrical test sequence on the “golden board.” Verify that the results are consistent with expectations.			
20	After verifying that the HP 3646A power is off, use the calibrated torque wrench to mate the two connector savers on the MCM under test to the corresponding connector savers on the test fixture. The torque shall not exceed 10 inch-oz. Power on the test equipment rack and log into the computer; start up the Resman and the GUI.			
30	Fill in the required information on the GUI box, including MCM serial number and operator ID. Start the test sequence.			
40	Review the test summary. If the test failed, the fill out an NCR. NCR number: _____ Attach the test summary to the Teledyne traveler.			
50	Disconnect the MCM from the test setup and place it in the appropriate cabinet.			

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ASSEMBLY AND INSPECTION DATA SHEET

AIDS NO. TMCM MIP-4 0001

Project LAT	Equipment Title Tracker MCM In-Process Inspection and Test MIP-4	Drawing/Part No. LAT-DS-00898 (short) LAT-DS-00899 (tall)	Revision	Serial Numbers				
Reference Designator N/A	Subsystem Tracker	Equipment Class Flight	Prepared By R. Johnson					

Approvals

Responsible Engineer D. Rich	Date	Manufacturing Engineer J. Clinton	Date
Quality Engineer D. Marsh	Date		

TMCM MIP-4: End Item Data Package Review and Approval

Notes:

- a. All MCM handling, inspection, and testing shall be done in compliance with LAT-MD-00404, LAT Contamination Control Plan.
- b. ESD-protection procedures shall be followed, as specified in NASA-STD-8739.7, at all times when handling MCMs outside of their closed production trays or sealed ESD-protective packages.
- c. The specification for this procedure is **LAT-PS-01971**. Refer to LAT-PS-01971 for details of each of the following steps, as well as for requirements and specifications and for descriptions of the test scripts.

Step	Instructions	Oper. ID	Date	Stamp
10	Check that each MCM is vacuum packed in an ESD protective bag. The serial number shall be clearly marked and visible.			
15	Check that the Teledyne shipper correctly identifies the serial numbers of the MCMs and also specifies the revision levels of the assembly drawings and process specification to which the MCMs were built.			
20	Check that there is a Teledyne Certificate of Compliance applicable to each MCM.			
30	Check that there is a complete copy of the Teledyne shop traveler with each MCM, including the electrical test report summaries.			

Distribution:

ASSEMBLY AND INSPECTION DATA SHEET

AIDS NO. TMCM MIP-4 0001

TMCM MIP-4: End Item Data Package Review and Approval

Notes:

- a. All MCM handling, inspection, and testing shall be done in compliance with LAT-MD-00404, LAT Contamination Control Plan.
- b. ESD-protection procedures shall be followed, as specified in NASA-STD-8739.7, at all times when handling MCMs outside of their closed production trays or sealed ESD-protective packages.
- c. The specification for this procedure is **LAT-PS-01971**. Refer to LAT-PS-01971 for details of each of the following steps, as well as for requirements and specifications and for descriptions of the test scripts.

Step	Instructions	Oper. ID	Date	Stamp
40	Check that there are no open NCRs applicable to any of the MCMs and that any relevant NCR has been properly dispositioned.			
50	Sign the Teledyne shipper and attach the SLAC MIP travelers, including this one, to the EIDP.			